



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1396 WO		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/BE 03/00056	International filing date (day/month/year) 28.03.2003	Priority date (day/month/year) 29.03.2002	
International Patent Classification (IPC) or both national classification and IPC B22D41/54			
Applicant VESUVIUS CRUCIBLE COMPANY et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 1 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 07.10.2003		Date of completion of this report 03.05.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Noske, W Telephone No. +49 89 2399-8448 	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/BE 03/00056**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-5 as originally filed

Claims, Numbers

1-9 received on 27.04.2004 with letter of 27.04.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/BE 03/00056**

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/BE03/00056

1. D1 FR-A-2 721 241, Fig. Fig. 1-5 and claims 1-15,
discloses a casting tube comprising a base body 2 of refractory material consisting of carbon bonded refractory oxides as alumina, zirconia, silica, magnesia (p. 5, l. 25-27). The base body 2 has an inner surface defining a pouring channel 4 which bears a coating layer 10 having a thickness of max. 10 mm (claim 12) comprising max. 9% carbon (claim 4) and at least 80% sinterable material selected from alumina, silica and/or clay (p. 6, l. 3-5). On being preheated to a temperature > 1000°C, the coating layer 10 forms a dense, gas impermeable, decarburized sintered layer 10a having a thickness of 3-5 mm and a non-decarburized layer 10b (p. 6, l. 23-28).
The layer 10 is either made separately from the base body 2 and joined therewith (claim 5) or pressed together with the base body 2 (claim 6).
2. The claimed subject-matter differs from nearest prior art D1 at least in that the insulating microspheres comprised in the insulating coating are "hollow".
This feature is disclosed in the original application, Example in p. 11, which mentions "fillite®" as being used as the insulating microspheres mentioned in original claim 4, said "fillite®" being known to the skilled person as consisting of **hollow** microspheres of alumino silicate, cf. material data sheet dated 1.4.96 received on 13.2.04.
Novelty is thus given.
An inventive step is given since the dense sintered layer 10a present in D1 is less heat insulating and none of the documents comprises any incentive to render this layer more heat insulating in order to improve thermal shock resistance.

10/509501
DT04 Rec'd PCT/PTO 28 SEP 2004

Claims.

1. Element for the casting of a liquid metal, comprising a base body made from a refractory material, said body comprising an outer surface and an inner surface defining a pouring channel for the casting of the liquid metal, characterized in that at least a part of the element inner surface is coated with an insulating coating comprising insulating hollow microspheres, preferably in an amount comprised between 5 and 40 weight % and forming, at the metal liquid contact, a gas impermeable layer.
2. Casting element according to claim 1, characterized in that the coating comprises 20 to 80 weight % of a ceramic matrix, preferably comprising silica or alumina.
3. Casting element according to claim 2, characterized in that the ceramic matrix comprises vitreous grains, such a atomized silica.
4. Casting element according to any one of claims 1 to 3, characterized in that the thickness of the coating is comprised between 1 and 10 mm.
5. Casting element according to any one of claims 1 to 4, characterized in that the impermeable layer and the refractory material are interpenetrated.
6. Casting element according to any one of claims 1 to 5, characterized in that the base body is constituted from a carbon bonded material.
7. Casting element according to any one of claims 1 to 6, characterized in that the casting element is a pouring shroud.
8. Casting element according to any one of claims 1 to 7, characterized in that at least a part of the external surface is coated with an insulating coating comprising insulating microspheres, preferably in an amount comprised between 5 and 40 weight %.
9. Process for coating a casting element comprising a base body made from a refractory material, said body comprising an outer surface and an inner surface defining a pouring channel for the casting of the liquid metal, comprising the steps of
 - preparing a slip comprising insulating hollow microspheres,
 - drying the slip at room temperature, preferably for at least two hours,
 - forming a gas impermeable layer from the dried slip by contacting the dried slip with liquid metal.